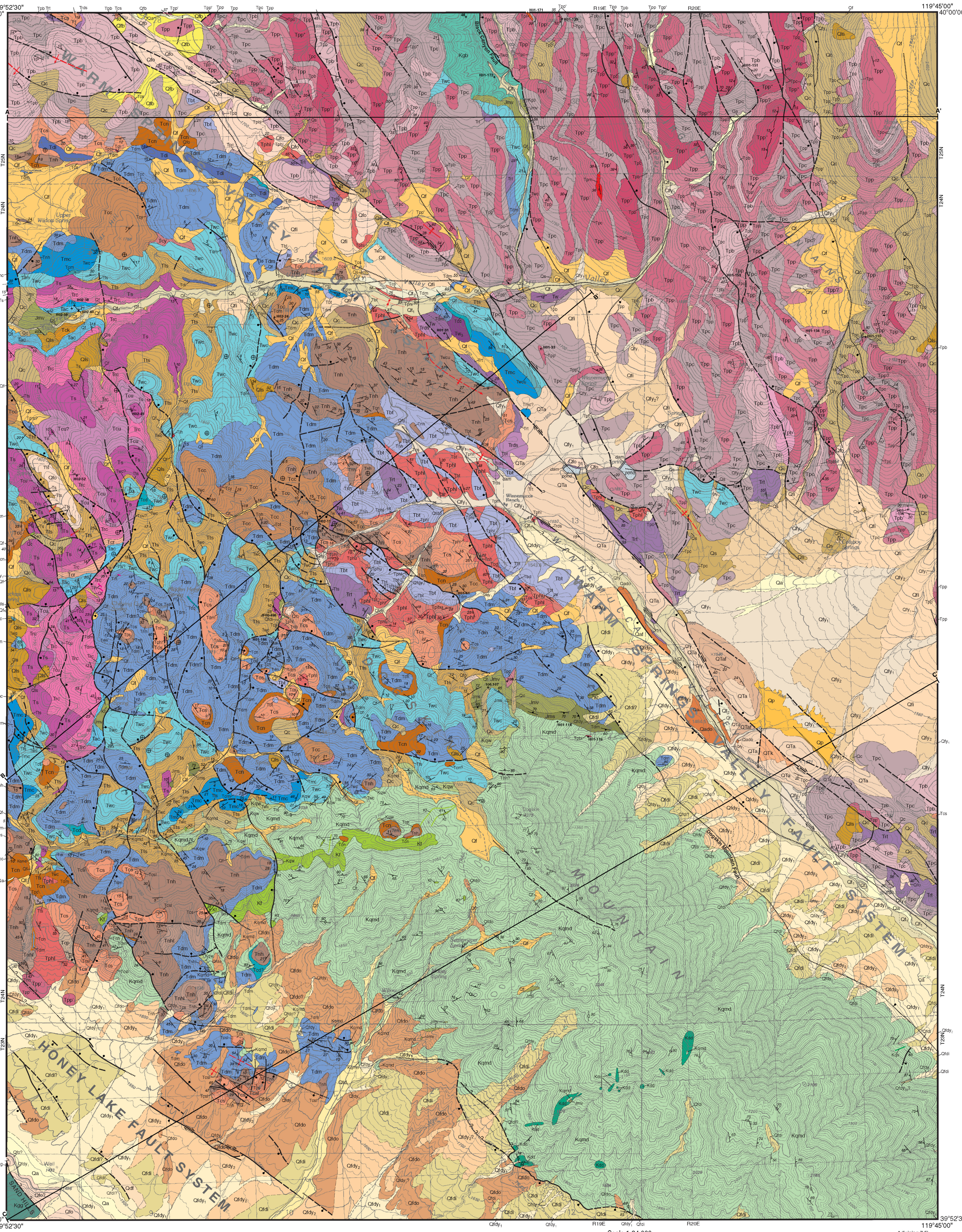

Qa Active alluvium

Qaf Fine-grained alluvium (Holocene and late Pleistocene)

Stream Channel Deposits of Winnemucca Valley

- Qt_1 Alluvial terrace deposits (late and middle Holocene)
- Qt_2 Alluvial terrace deposits (earliest Holocene and latest Pleistocene)
- Qc Undifferentiated Quaternary colluvium and talus
- Qls Landslide deposits
- Qf Undifferentiated Quaternary alluvial fan deposits
- Qfb Undifferentiated Quaternary alluvial fan deposits (basalts)

Alluvial Fans and Other Deposits of Dogskin Mountain

- Qtd_1 Alluvial terrace deposits (late and middle Holocene)
- Qdf Fine-grained deposits (Holocene and late Pleistocene)
- $Qfdy_1$ Younger alluvial fan deposits (late and middle Holocene)
- $Qfdy_{1b}$ Megabreccia of granite (late and middle Holocene)
- $Qfdy_2$ Alluvial fan deposits (early Holocene and latest Pleistocene)
- $Qfdy_{2b}$ Megabreccia of granite (early Holocene and latest Pleistocene)
- Qfdi Intermediate-age alluvial fan deposits (late and middle Pleistocene)
- Qfdo Alluvial fan of granite (middle and early Pleistocene)
- Qado Older/deformed fan deposits (late? and early Pleistocene)

Alluvial and Other Deposits of the Virginia Mountains

- Qs Spring deposits
- Qfy_1 Alluvial fan and stream terrace deposits (late and middle Holocene)
- Qfy_2 Alluvial fan and stream terrace deposits (early Holocene and latest Pleistocene)
- Qp Ponded deposits
- Qfi Intermediate-age alluvial fan deposits (late and middle Pleistocene)
- Qfo Alluvial fan deposits (middle? and early Pleistocene?)

Pleistocene(?) and Late Pliocene Alluvial Deposits

- QTa Pleistocene and late Pliocene(?) alluvial deposits
- QTaf Finer grained alluvial deposits
- QTk Pleistocene(?) and late Pliocene sandstone

Pyramid Sequence

- Tpc Conglomerate, sandstone, and breccia
- Tpbi Basaltic andesite dike
- Tpp Porphyritic basaltic andesite lava
- Tpb' Sparsely porphyritic basaltic andesite lava
- Tpp' Finely porphyritic basaltic andesite lava
- Tpp" Bimodal porphyritic basaltic andesite lava
- Tpr Porphyritic rhyolite lava
- Tpm Tuff of Mullen Pass
- Tpb Basalt to basaltic andesite lava

Miscellaneous Intrusions

- Tdi Porphyritic dacite intrusions
- Tih Hornblende andesite dike

Rhyolite Group

- Trds Rhyolite-clast conglomerate
- Trt Rhyolite-dacite ash-flow tuff
- Tbt Tuff breccia; includes megabreccia
- Tbd Rhyolite-dacite breccia
- Tri Rhyolite intrusion (cross section B - B' only)

Oligocene Ash-Flow Tuffs

- Tphu Upper tuff of Painted Hills
- Tphl Lower tuff of Painted Hills
- Tcp Sedimentary rocks below tuff of Painted Hills
- Tcs Tcsl Tuff of Chimney Spring; Tcsl, poorly welded basal part of Tcs
- Tnh Tnhl Nine Hill Tuff; Tnhl, basal part of Tnh
- Tcn Conglomerate/breccia
- Tw Tuff of Winnemucca Ranch
- Tcc Tuff of Campbell Creek
- Tcy Conglomerate below tuff of Campbell Creek
- Tdm Tuff of Dogskin Mountain
- Tcd Debris-flow deposits and conglomerate within the tuff of Dogskin Mountain
- Tw_3 Tuff 30
- Tmc Tuff of Mine Canyon
- Tcm Conglomerate below the tuff of Mine Canyon
- Twc Twcu Tuff of Cove Spring; Twcu, upper part of tuff of Cove Spring
- Tts Bedded tuff and tuffaceous sedimentary rock
- Ts Tuff of Sutcliffe
- Tcu Sedimentary rocks below tuff of Sutcliffe
- Trc Tuff of Rattlesnake Canyon
- Tcr Sedimentary rocks below tuff of Rattlesnake Canyon
- Thc Tuff of Hardscrabble Canyon
- Tac Tuff of Axehandle Canyon
- Tck Basal Tertiary conglomerate

Mesozoic Rocks

Cretaceous granitic rocks

- Kgg Granite of Granite Peak
- Kgb Granodiorite of Black Canyon
- Kf Aplitic to pegmatitic dikes and irregular intrusions
- Kdd Diorite dikes
- Kqw Weathered quartz monzodiorite
- Kqmd Kqv Quartz monzodiorite; quartz vein (Kqv)

Jurassic(?) metamorphic rocks

- Jmv Jms Jurassic(?) metavolcanic and metasedimentary rocks

Contact Long dashes where approximately located; short dashes between different tuffs, cooling units, lavas or alluvial fans within same map unit; queried where uncertain; dotted where concealed.

Fault Bar and ball on downthrown side; double arrows show sense of strike-slip offset; dashed where approximately located, queried where uncertain, dotted where concealed. On cross sections, A = away; T = toward.

Monocline axial trace Arrow indicates direction of dip.

Syncline axial trace Showing plunge, dashed where approximately located.

Landslide headwall scarp Ticks point down slope.

Strike and dip of beds

20 Inclined ⊕ Horizontal

Strike and dip of compaction foliation in ash-flow tuff

30 Inclined Vertical 75 Overturned

Strike and dip of flow bands in lava or intrusion

70 Inclined Vertical

Continuous curving flowbands

Strike and dip of metamorphic foliation

70 Inclined Continuous curving foliation

Joint

70 Inclined Vertical

Columnar joint Showing bearing and plunge.

67

Sample location for $^{40}Ar/^{39}Ar$ date or chemical analysis

+ H01-49

Field work done in 2001-03.

Office Review: Stephen Castor, NBMG; John Dilles, Oregon State University; Larry Garside, NBMG; Kyle House, NBMG; Alan Ramelli, NBMG; Marith Reheis, U.S. Geological Survey

Field Review: Stephen Castor, NBMG; Larry Garside, NBMG; Kyle House, NBMG; Alan Ramelli, NBMG; Marith Reheis, U.S. Geological Survey

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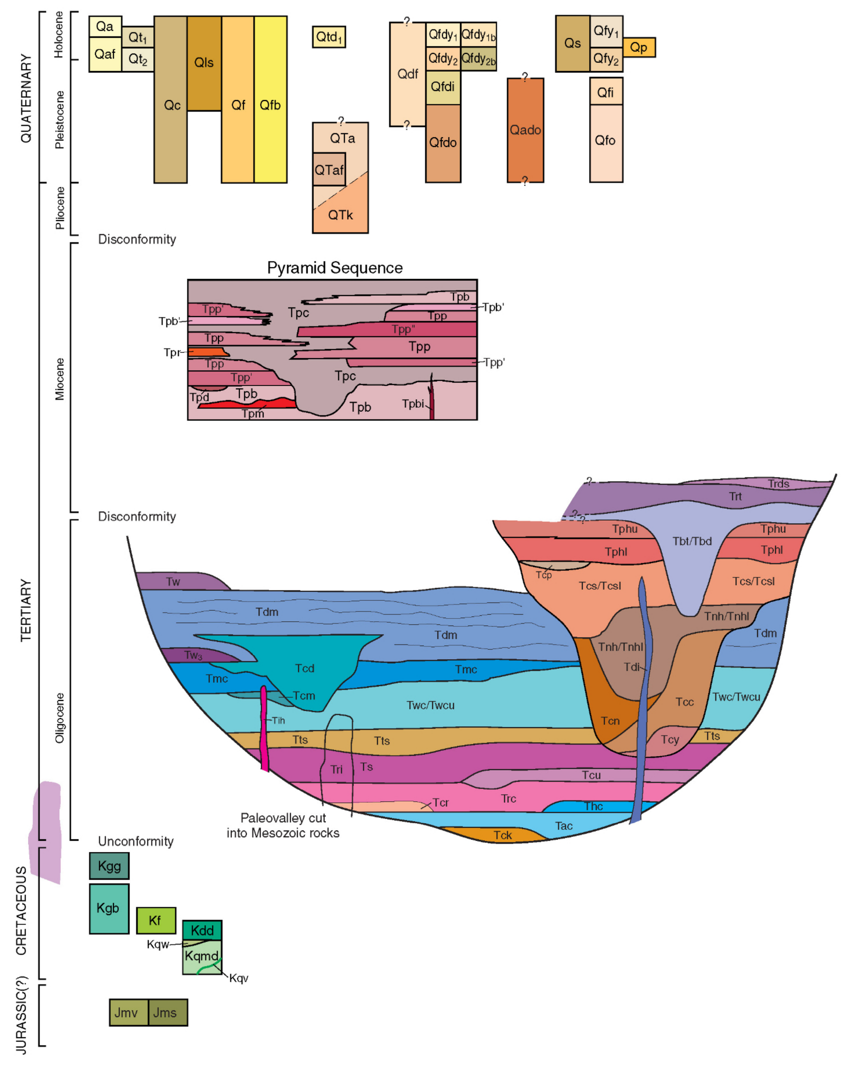
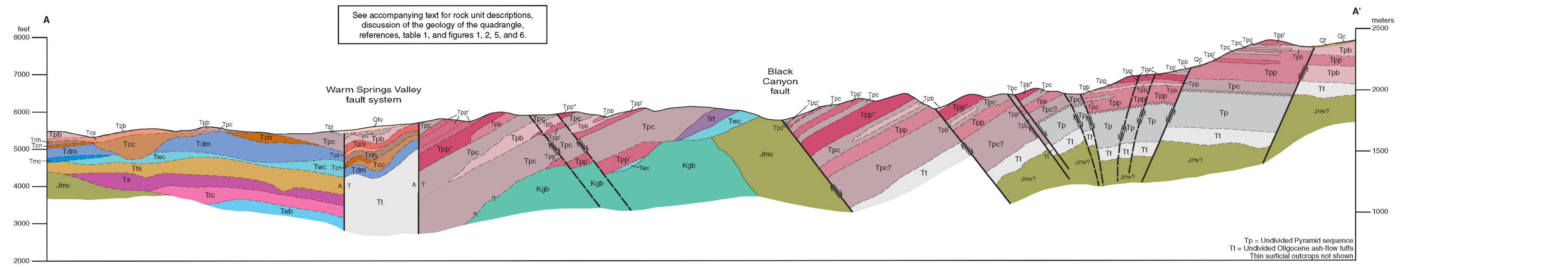
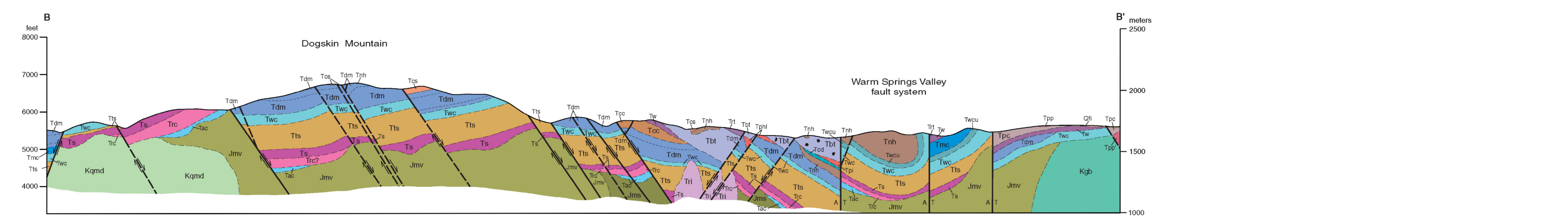
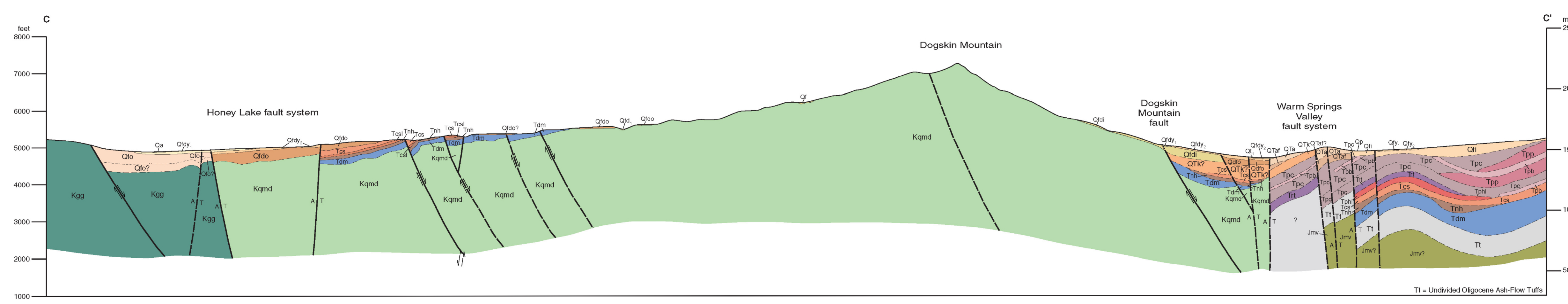
Nevada Bureau of Mines and Geology
University of Nevada, Mail Stop 178
Reno, Nevada 89557-0088
(775)784-6691, ext. 2;
www.nbmg.unr.edu; nbmgsales@unr.edu



See accompanying text for rock unit descriptions, discussion of the geology of the quadrangle, references, table 1, and figures 1, 2, 5, and 6.







GEOLOGIC MAP OF THE DOGSKIN MOUNTAIN QUADRANGLE, WASHOE COUNTY, NEVADA

Christopher D. Henry, James E. Faulds, Craig M. dePolo, and David A. Davis

2004

Scale 1:24,000

0 0.5 1 kilometer

0 0.5 1 mile

0 1000 2000 3000 4000 5000 feet

CONTOUR INTERVAL 10 METERS

Base map: East half of the U.S. Geological Survey Dogskin Mountain Nevada - California, 7.5'x15' 1:25,000-scale Quadrangle which includes Seven Lakes Mtn. 7.5' Quadrangle, 1979 Digital Raster Graphic (DRG) 1927 North American Datum

Adjoining 7.5' quadrangle names

1	2	3
4		5
6	7	8

1 State Line Peak
2 Spanish Flat
3 Pyramid SW
4 Seven Lakes Mtn.
5 Tule Peak
6 Granite Peak
7 Bedell Flat
8 Fraser Flat

Table 2. Data on ash-flow tuffs of the Dogskin Mountain area.

Tuff	Map symbol	Maximum thickness (m)	Age* (Ma)	± 2s	Mineral	Sample	Source	Phenocrysts total %	plagioclase %	plagioclase diam	quartz %	quartz diam	sanidine %	sanidine diam	biotite %	biotite diam	hornblende %	hornblende diam	other
rhyolite-dacite tuff	Trt	50	23.7		sanidine		rhyolite domes, Tule Peak Quadrangle	35–45	25–35	<1–4	2–4	1–4	0–4	5–15	4–5	<1-3	1–4	<1–5	
upper tuff of Painted Hills	Tphu	25	24.90	0.06	sanidine	MC-15**	caldera, Stillwater Range	20–25	10	.5–2	3–4	1–3	8	1–3	2–3	1, 2			
lower tuff of Painted Hills	Tphl	50	24.9				caldera, Stillwater Range	20–25	8	<1–3	3–5	1–5	10	≤2	1–3	1, 2			
tuff of Chimney Spring	Tcs	50	25.07	0.06	sanidine	MC-12**	caldera, Stillwater Range	25–40	0–3	<1–2	10–20	1–3	10–20	1–3	<1–2	≤1	<1	≤0.7	
Nine Hill Tuff	Tnh	100			sanidine		unknown; beneath Carson Sink?	12–15	<1–2	1–2	<1	1–2	3–8	1–4	<1	≤1			anorthoclase,
	Tnhl		25.25	0.06		MC-10**		5			<1	1–2	2–3	1–4	<<1	≤1			clinopyroxene
tuff of Winnemucca Ranch	Tw	50	28.54	0.10	sanidine	H02-11	unknown	20	1	≤1	3	≤1	15	≤1.5	0.5	≤1			
			28.58	0.10	sanidine	H01-31													
tuff of Campbell Creek	Tcc	160	28.86	0.06	sanidine	H01-61	caldera, Desatoya Mts	10–15	2–6	1–2	5–7	<1–5	4–6	1–3	<1	1, 2			
			28.86	0.10	sanidine	H02-24													
tuff of Dogskin Mountain	Tdm	120	29.21	0.10	plagioclase	MC-6**	unknown	25–35	20–25	1–3	≤1	1–2	<1	≤1	2–4	1, 2			
tuff 30	Tw_3	30					unknown	15–20	8–10	≤ 2			5–7	≤1.5	2	<1-2			
tuff of Mine Canyon	Tmc	30	29.92	0.07	sanidine	MC-2**	unknown	15	8–10	<1–3			3–5	1–4	1–2	<1-2			
tuff of Cove Spring	Twcu	50					unknown	10–12	6–8	<1–3	tr	1–2	3–4	1–5	0–1	1, 2			
	Twc		30.13	0.06	sanidine	H01-184													
bedded tuff and sediment	Tts	100						30–40	25–30	<1–4	tr	<1	0–1	≤1	2–8	1, 3			
tuff of Sutcliffe	Ts	100	30.42	0.07	sanidine	H02-41	unknown	20–30	10–20	1–3	1	<2	5–8	1–4	1–4	≤3			clinopyroxene
			30.04	*0.07*	sanidine	JF00-496													
tuff of Rattlesnake Canyon	Trc	100	31.12	0.08	sanidine	H02-52	?caldera, Clan Alpine Mts	20	8	1–4	1	≤1.5	12	1–5	1	≤2			
tuff of Hardscrabble Canyon	Thc	20	31.33	0.09	sanidine	H02-58	unknown	10	2		5	≤2	3	≤2	<1	1			
tuff of Axehandle Canyon	Tac	>60	31.31	0.09	sanidine	H02-59	unknown	20	13	<1–2	<1	≤2	4	<1–2	2–3	≤3			
			31.24	0.09	sanidine	H02-60		8	3		tr	≤2	4	<1–2	1	≤2			

* age with ± value is $^{40}Ar/^{39}Ar$ age determined on sample listed in table 3; age without ± is based on stratigraphic relations to dated units; age in italics is too young, probably because of alteration.
** in Tule Peak Quadrangle
diam = diameter in millimeters.

Table 3. $^{40}Ar/^{39}Ar$ dates, Dogskin Mountain area.

Sample #	Material	Age (Ma)	±2s	K/Ca	±1s	n**	Map symbol	Map unit	Latitude Degrees	Latitude Minutes	Longitude Degrees	Longitude Minutes
CD00-TP01*	plagioclase	3.59	0.17	0.067	0.012	17	QTk	late Pliocene sandstone	39	52.880	119	43.120
H01-171	plagioclase	14.98	0.10	0.092		97.6	Tpr	porphyritic rhyolite lava	39	59.990	119	48.300
MC-17*	sanidine	23.77	0.06	51.5	7.2	10	Tbd	rhyolite-dacite breccia	39	53.800	119	40.950
C98-79*	sanidine	23.67	0.08	37.5		82.5	Tri	porphyritic rhyolite dome	39	52.550	119	39.280
C98-79*	biotite	23.91	0.39	18.8		91.9	Tri	"	39	52.550	119	39.280
MC-15*	sanidine	24.90	0.06	47.0	3.5	14	Tphu	upper tuff of Painted Hills	39	53.770	119	41.200
MC-12*	sanidine	25.07	0.06	37.1	11.3	15	Tcs	tuff of Chimney Spring	39	53.790	119	41.200
MC-10*	sanidine	25.25	0.06	9.1	2.4	15	Tnh	Nine Hill Tuff	39	53.930	119	41.180
H01-31	sanidine	28.58	0.10	8.6	8.5	14	Tw	tuff of Winnemucca Ranch	39	58.000	119	48.970
H02-11	sanidine	28.54	0.10	9.5	8.7	15	Tw	"	39	56.820	119	49.840
H01-61	sanidine	28.86	0.06	57.5	5.8	16	Tcc	tuff of Campbell Creek	39	56.400	119	48.860
H02-24	sanidine	28.86	0.10	59.6	6.6	15	Tcc	"	39	58.120	119	50.370
MC-6*	sanidine	29.21	0.10	28.1	1.7	4	Tdm	tuff of Dogskin Mountain	39	54.000	119	41.300
MC-2*	sanidine	29.92	0.07	25.6	1.4	14	Tmc	tuff of Mine Canyon	39	53.990	119	41.930
H01-184	sanidine	30.13	0.06	29.3	4.5	16	Twc	tuff of Cove Spring	39	56.120	119	50.580
H02-41	sanidine	30.41	0.07	32.4	5.2	15	Ts	tuff of Sutcliffe	39	57.546	119	51.506
JF00-496	sanidine	*30.04*	*0.07*	30.8	7.9	13	Ts	"	39	56.260	119	50.330
H02-52	sanidine	31.11	0.08	39.0	8.0	15	Trc	tuff of Rattlesnake Canyon	39	57.251	119	51.988
H02-58	sanidine	31.33	0.09	69.3	47.4	15	Thc	tuff of Hardscrabble Canyon	39	58.219	119	52.006
H02-59	sanidine	31.31	0.09	46.7	12.1	16	Tac	tuff of Axehandle Canyon	39	58.182	119	51.973
H02-60	sanidine	31.24	0.09	43.9	8.6	15	Tac	"	39	58.164	119	51.889

* In Tule Peak Quadrangle
** n = number of single grains analyzed or % of total ^{39}Ar in plateau (H01-171, C98-79)
Age of sample JF00-496 is too young, probably because of alteration
Minerals were separated from crushed, sieved samples by standard magnetic and density techniques; feldspars were leached with dilute HF to remove matrix and handpicked. All analyses at New Mexico Geochronological Research Laboratory, New Mexico Institute of Mining and Technology. Analytical methods in McIntosh and Chamberlin (1994). Weighted mean $^{40}Ar/^{39}Ar$ ages calculated by the method of Samson and Alexander (1987). Samples were irradiated in Al discs for 7 hours in D-3 position, Nuclear Science Center, College Station, TX. Neutron flux monitor Fish Canyon Tuff sanidine (FC-1); assigned age = 28.02 Ma (Renne and others, 1998). Decay constants and isotopic abundances after Steiger and Jäger (1977).

Table 4. Petrographic data for rocks of the Pyramid sequence.

Map unit	symbol	Phenocrysts total %	plagioclase %	plagioclase diam	olivine %	olivine diam	clinopyroxene %	clinopyroxene diam	orthopyroxene %	orthopyroxene diam	biotite %	biotite diam	hornblende %	hornblende diam	other
Basalt to basaltic andesite	Tpb				0–5										
Porphyritic basaltic andesite	Tpp	15–30	10–25	5–20	5–8	0.1–1	3	0.5							
Sparsely porphyritic basaltic andesite	Tpb'	10	3–5	5–10	0–5										
Finely porphyritic basaltic andesite	Tpp'	25–35	20–25	2–5	1–5	0.5–2	4–8	1–5							
Bimodal porphyritic basaltic andesite	Tpp"	25–35	20–30	2–4; 10x2	<1	1–2	3–8	1–4							
Porphyritic rhyolite	Tpr	25	24	1–5			<1	<1			<1		<1	<1	
Tuff of Mullen Pass	Tpm	25–30	20–25	<1–3			2	<-2	<1	0.7				0.5–3	magnetite
Basaltic andesite dike	Tpbi	12–25	10–20		1–3	1	1–2	1							

diam = diameter in mm. Olivine is altered to iddingsite in many samples.

Table 5. Chemical analyses of rocks of the Dogskin Mountain area.

Pyramid Sequence:

Sample	H00-20	H01-152	H00-15	H99-57	H00-14	H00-40	H01-156	H01-153	H01-155	H01-151	H01-33	H00-25	H01-119	H01-154
Map symbol	Tpb	Tpb	Tpb	Tpb	Tpb	Tpb	Tpb'	Tpb'	Tpp'	Tpp'	Tpp"	Tpp	Tpbi	Tpb
Rock name	basalt	basalt	basalt	bas-and	bas-and	bas-and	bas-and	bas-and	bas-and	bas-and	bas-and	bas-and	bas-and	andesite
Quadrangle	TP	SF	TP	TP	TP	TP	D	D	D	D	D	TP	D	D
Longitude 119°	43.6	47.1	44.5	38.1	44.4	44.5	45.2	46.7	45.6	46.6	48.2	43.1	47.8	46.1
Latitude 39°	56.2	40° 0.5	55.5	53.7	55.5	56.0	56.9	58.4	58.0	59.7	57.9	55.4	55.5	58.0
SiO_2	51.04	51.46	51.53	52.15	52.25	52.57	54.10	54.22	54.68	56.02	56.22	56.10	56.91	62.15
TiO_2	1.32	1.18	1.28	1.11	1.94	1.14	1.52	1.73	1.10	0.98	1.03	1.37	0.84	1.28
Al_2O_3	16.99	17.18	16.61	16.67	16.17	18.22	17.48	17.23	18.64	17.74	18.31	17.24	18.75	16.48
FeO*	8.92	8.70	9.28	9.36	10.45	8.23		9.05	8.02	7.42	7.09	7.83	6.33	5.93
MnO	0.16	0.15	0.16	0.16	0.19	0.15	0.15	0.15	0.13	0.14	0.13	0.13	0.10	0.12
MgO	7.02	7.76	7.35	7.50	4.95	5.38	4.04	3.45	4.33	4.46	4.32	3.59	2.81	1.57
CaO	9.94	8.94	9.37	8.44	8.18	9.50	7.56	7.06	7.57	7.71	7.49	7.19	9.66	4.10
Na_2O	3.32	3.11	3.14	3.31	3.37	3.43	3.90	4.16	3.86	3.55	3.57	3.80	3.10	4.61
K_2O	0.94	1.18	0.96	0.97	1.58	1.06	1.95	2.20	1.38	1.67	1.53	2.22	1.29	3.21
P_2O_5	0.34	0.34	0.33	0.34	0.92	0.31	0.56	0.75	0.30	0.31	0.31	0.53	0.23	0.55
Total*	99.52	99.44	99.35	99.91	99.40	99.60	99.40	99.50	99.64	100.38	100.23	99.19	96.17	99.58
Sc	21	29	28	25	23	27	23	21	15	18	17	23	18	16
V	224	212	216	217	220	248	253	241	215	196	190	231	173	95
Cr	196	271	319	307	112	87	37	17	24	53	58	68	10	3
Ni	95	149	215	185	46	50	28	15	27	33	30	51	7	3
Cu	39	67	45	78	32	67	149	171	79	42	68	143	49	32
Zn	84	85	94	91	134	83	103	115	96	89	89	106	83	113
Ga	16	17	18	17	17	19	24	22	18	20	21	20	22	22
Rb	17	23	17	12	22	13	38	43	25	34	20	51	28	86
Sr	525	509	506	514	590	684	611	549	682	679	642	566	674	410
Y	27	22	25	22	45	22	32	36	21	22	21	30	18	39
Zr	109	115	106	102	258	92	181	212	106	124	123	178	113	240
Nb	9.6	7.0	8.4	5.2	18.7	4.5	10.2	12.1	5.4	6.3	7.4	9.9	3.7	13.2
Ba	465	553	636	471	1015	507	790	872	583	656	794	836	731	1144
La	13	19	10	22	25	22	18	31	21	19	18	26	18	47
Ce	41	44	48	53	87	32	65	73	32	50	44	54	26	68
Pb	3	3	5	9	9	6	15	11	15	10	7	11	9	17
Th	3	3	2	2	5	1	7	5	3	5	7	4	2	11

Rhyolite domes and related dikes and tuffs:

Sample	H01-171	H01-123	H99-67	H00-27	H99-50	C98-79	H00-19
Map symbol	Tpr	Tpr	Tpm	Tdi	Tdi	Tri	Trt
Rock name	rhyolite	rhyolite	dacite tuff	andesite	andesite	rhyolite	dacite tuff
Quadrangle	D	D	TP	TP	TP	S	TP
Longitude 119°	48.3	47.5	52.6	38.8	55	39.28	43.0
Latitude 39°	59.99	59.9	53.2	52.7	52.8	52.55	54.8
SiO_2	70.47	71.47	65.84	61.79	60.60	70.21	67.51
TiO_2	0.55	0.37	0.72	0.67	0.74	0.43	0.55
Al_2O_3	16.00	15.48	16.01	16.73	16.87	15.15	17.02
FeO*	2.37	1.86	3.56	5.49	5.48	2.76	3.22
MnO	0.03	0.08	0.12	0.12	0.30	0.04	0.04
MgO	0.28	0.54	1.37	2.30	1.65	1.06	0.74
CaO	1.29	1.73	3.83	6.22	7.90	2.43	3.40
Na_2O	4.22	4.05	3.53	3.75	3.69	3.73	3.70
K_2O	4.70	4.33	4.73	2.70	2.54	4.04	3.64
P_2O_5	0.09	0.10	0.29	0.22	0.23	0.149	0.17
Total*	99.38	98.85	95.15	97.31	96.99	99.09	98.58
Sc	9	0	7	14	19	11	10
V	20	14	44	142	135	59	77
Cr	0	0	3	27	32	8	15
Ni	6	4	17	15	16	4	13
Cu	6	3	4	20	22	5	8
Zn	42	51	85	73	72	51	68
Ga	19	17	19	19	18	18	17
Rb	140	105	79	63	52	107	103
Sr	239	271	454	623	632	322	499
Y	34	19	27	15	15	13	16
Zr	303	200	278	118	120	154	164
Nb	14.2	9.5	14.7	5.8	6.6	10.9	8.6
Ba	1536	1137	1633	990	961	1242	1093
La	47	22	43	26	23	34	37
Ce	74	41	62	50	28	50	64
Pb	19	18	17	18	19	21	16
Th	15	12	7	12	9	12	9

Analyses by XRF at Washington State University
Quadrangles: D = Dogskin Mountain, S = Sutcliffe, SF = Spanish Flat, TP = Tule Peak
All analyses normalized to 100% anhydrous. FeO* = all Fe expressed as FeO; Total* = total before normalization to 100% anhydrous
bas-and = basaltic andesite

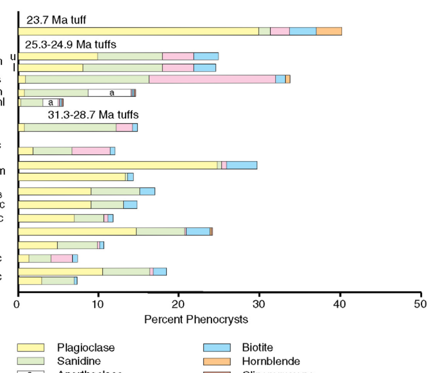


Figure 3. Phenocryst assemblages and average abundances in ash-flow tuffs of the Dogskin Mountain Quadrangle.

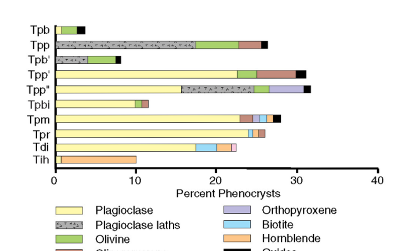


Figure 4. Phenocryst assemblages and average abundances in lava and ash-flow tuff of the Pyramid sequence and miscellaneous intrusions in the Dogskin Mountain Quadrangle.